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ABSTRACT

With the scholarly record growing faster than funds to employ individuals in libraries to process materials for storage and distribution, libraries must use electronic data processing equipment to distribute such information. The electronic world, however, requires that different interinstitutional relationships be established. Although the possibilities for action seem to be many, the limitations are real, e.g., (1) the nation's libraries are dependent on the 80-year old program of the Library of Congress (LC) to catalog the world's literature; (2) existing bibliographic utilities are dependent on the high quality and quantity of LC's bibliographic production; and (3) the utilities have not been able to deliver all the services they say are technically feasible. Thus no single library is independent of LC's bibliographic control, and the electronic distribution of records has roots in the past and future national bibliographic system. Interdependence among libraries is increased by the requirement to communicate bibliographic information; the unanswered question is how this interdependence grows. Does each library proceed on its own and make changes whenever necessary as the national system evolves, or do libraries form an organization for the purpose of sharing development and implementation costs with the expectation of lower costs and work more consistent with the national system? (Author/CMV)

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Working Paper No. 14

Directions and Limitations of Automated Library Systems

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Vern M. Pings

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM"

By Vern M. Pings

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Detroit
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ABSTRACT

The distribution of the scholarly record through libraries must use electronic data processing equipment. The record grows faster than funds to employ individuals in libraries to process materials for storage and distribution. The electronic world, however, requires that we create different interinstitutional relationships. While the possibilities for action seem to be many, the limitations are real. The nation's libraries are dependent on the 80 year program of the Library of Congress (LC) to catalog the world's literature. Existing bibliographic utilities are dependent on the high quality and quantity of LC's bibliographic production. The utilities have not been able to deliver all the services they say are technically feasible. Given this environment, no single library is independent of LC's bibliographic control and the distribution of records electronically--whatever steps it takes to "automate" have roots in the past and future national bibliographic system. Interdependence among libraries increase because of the requirement to communicate bibliographic information. The unanswered question is how this interdependence grows--does each library proceed on its own and make changes whenever necessary as the national system evolves, or do libraries form an organization with the purpose to share development and implementation cost with the expectation the cost will be less and the work done will be more consistent with the national system?

Introduction

One of the commodities of the world in surplus is information.(1) Library agencies are under pressure to make decisions about their missions and about their use of the many methods for processing, storage, retrieval and dissemination of information. The decisions to alter or to incorporate new methods and to use new technology are made the more difficult because almost any action will require increasing dependence on outside agencies, be they other libraries, purveyors of electronic devices, computer centered bureaucracies, cooperative bureaucracies or government monitoring agencies. Another quality surrounding the decision making is the commitment that is required: any action taken involving electronic equipment necessitates an investment that appears large relative to past activities and although not irreversible, action once begun seems to require even greater effort to alter than starting the original action. This situation is not peculiar to the library world, as one student editor exclaimed:

> This society, its masses, institutions, universities and even students of its universities have shown a new low in uptightness and untogetherness. When faced with the incongruities of our general way of life, people still tend to shrug off participation as something for the other guy. This reads like: "Don't bother me, I'm too uptight to get it together."(2)

Decisions of library agencies, even for the smallest, seem to lead to factors that have national impact on intellectual problems of bibliographic control, on electronic instrumentation and on the appropriateness of specific systems. These "large" and significant choices have and do cause confusion in communication among library specialists and among administrative superiors. How will each institution fit into the national library system of the National Commission of Library and Information Science

(NCLIS) and the national computer network of the Library of Congress (LC)? Reducing a situation to less global proportions one finds that proponents of software systems are unaware of the complexities (if not illogicality) of bibliographic and inventory control; bibliographers expect electronic instruments to function as intuitively as they; computer specialists assume an infinite capacity for their instruments. Welke in another context remarked,

> Information problems, by definition, are multi-solution. There are no rules or standards that would tell you the problem is right or wrong, much less that the solution to the problem is right or wrong. Consequently we are left with the only measurement for a program being: does it work? And, in reality, that's the wrong question. The real question is: is it right? Unfortunately, all too often we don't ask that question for fear of the answer. So, with no rules or standards leading us to ask the wrong questions, we find ourselves managing through the use of what might be called pseudo-rules or beliefs. And nowhere in these beliefs have we allowed for a rigorous definition of what is required of reliability. It is possible to have a program that works, but is not right. It is a program that does not provide the right answer but is consistent in not providing it.(3)

Each of the components of the decision process as categorized here is quite different from one another, but are interlocking. Decision by a library agency in one area affects its ability to respond and to act independently in another area. The purpose of this paper is to explore distinctionsamong aspects already enumerated of library information processing--the intellectual, the technology, the design, the interdependence of library agencies and their relatedness--with the expectation that decisions about the use of data processing eqiupment will result in operations that have a semblance of continuity and reliability.

The Library of Congress

Through the 19th century research libraries "indexed" many serials (some libraries, of course, still do) even though the index journal had been invented earlier in the century. But by

1900 many scholarly and professional organizations took on the responsibility of "centralizing" the indexing of serial literature because libraries could no longer afford to do the indexing. These services are still being published with new ones being created yearly. These services are in turn being modernized through another centralizing process by placing them on-line through a computer center network. A single language is used to access different data bases even though they have different qualifiers and are prepared under different rules.

At the same time libraries gave up indexing serials, LC became a centralizing force in the bibliographic control of all items collected by libraries (except for the content of serials) when it began distributing its cards in 1903. The cataloging of items was done once for the nation by LC and all libraries could buy the cards saving the cost of the cataloging process.

The cataloging system practiced by the Library of Congress at the turn of the century was what evolved in the American environment. The objective was to bring like items together physically and bibliographically through rules of description and through classification. The scholarly world should not underestimate the significance of this objective to identify the content of publications to allow the bibliographic description to serve as an ordering of graphic material. The decisions of LC then and now influence our decisions on placing bibliographic data into electronic form. LC evolved a set of techniques and created bibliographic instruments on which the nation depends. There are few libraries which can say they are independent of LC's authority files. There are probably even fewer libraries which are completely independent of LC's cataloging process. The few libraries in the nation that must maintain name, title and/or subject authority files are those whose collections include items not ordinarily acquired by LC. Even these libraries do not maintain authority files which are independent of LC. The skill of cataloging in these libraries involves guessing what LC would establish as authoritative should

LC catalog the item at some future date. Not an uncommon complaint of the "errors" of contributed copy to the OCLC data base is the instance in which a library adds a title to the data base using old LC cataloging copy without updating to match current authority file data. The dependence of the nation's libraries on LC's cataloging scholarship and skills is all but complete. There is no one library in the nation that has authority files available to substitute for those of LC nor could the responsibility be given to another North American library agency to develop and maintain them without access to LC's collection or without building an equivalent LC. All planners and designers of electronic systems, whether they are an individual or a group enterprise on a regional or national basis, do use and must use LC bibliographic products. Planners have misinterpreted the significance of LC authority files. Because indiviudal libraries do not maintain the technical cataloging control of LC does not mean the bibliographic control established by LC is not used by those libraries. To re-emphasize, the 19th century ideal has been attained that cataloging is done once for all libraries of the nation. For all but a few libraries of the nation it is only a matter of copying or at most modifying LC cataloging data whether they do it in-house or obtain it through a commercial service or an on-line data base.

Electronic Bibliographic Utilities

Although LC is still distributing its cataloging production in printed form, the 75 year old distribution system has undergone change because the catalog production can now be published in a standard format, MARC, and distributed electronically. There have been many efforts to use this magnetic format. LC itself apparently has entertained the idea that it could organize a national electronic distribution system, or network, to communicate or to distribute its computer sensitive records in place of using the U. S. mail. Congress, however, seems to feel such a venture would be inappropriate for its library.(4) There are two national bibliographic "utilities" distributing the data available from LC through its MARC Distribution Service, OCLC, Inc. and the Research

Libraries Information Network (RLIN). The Washington Library Network (WLN) is a regional, not national, organization and is more interested in selling its software rather than distributing bibliographic data or networking its service on a national basis.(5) There are other agencies that distribute or use the MARC Distribution Service for libraries which might be considered utilities, for example, Blackwell North America, Inc., Baker & Taylor and Company and others. These commercial endeavors are for one purpose or limited in scope whereas the "utilities" mentioned above have the stated purpose of eventually being all encompassing. There are some large libraries (New York Public, Northwestern, University of Chicago) that have developed local systems, but they are discovering the cost of manipulating large data bases are beyond their resources. The cost of building and maintaining data bases apparently must be shared for at least the foreseeable future.

For any individual library to use any network facility requires that library to join a group. To have access to OCLC, for example, a library must work through a service center, such as the Michigan Library Consortium (MLC). At present there are different options to have access to RLIN but it is nevertheless a membership organization. A library agency using either network is under the influence of two organizational forces: the bureaucracy of the data base holder and the bureaucracy and influence of the membership group. It is not surprising therefore, that the governance of consortia, cooperatives or networks using on-line data bases is a sensitive matter. The interrelatedness bibliographically and financially of a network, as already noted, prevents freedom of decision by individual libraries. Intellectual and technical decisions have to be weighed in relationship to a membership in a complex social organization. In reviewing the state of the art of network participation it is difficult to define a perspective that has any stability beyond the day it is defined, yet each library agency must make decisions to employ a specific set of technology or to join a network or engage in similar activity. Since neither of the utilities seem to deliver

what they promise, nor is their any assurance that either system can be redesigned to accomplish what is promised, the tendency is to search for alternatives or to find ways to augment the services. The situation for MLC members might be characterized as follows:

1. Shift from OCLC to RLIN, and
   a. Augment the system locally (see 3 below), or
   b. Trust that the utility will be able to accomplish what it proposes.
2. Remain with OCLC, and again, augment the service locally and/or trust OCLC will become the national bibliographic system.
3. With either utility the options to augmented services might include that
   a. Each library undertake its augmentation separately from any other library, for example, each produces its own COM catalog with its own rules;
   b. The MLC libraries agree to buy the same hardware so that software application can be uniform throughout Michigan;
   c. MLC develop the interface between the hardware complexes of separate libraries to be able to use different or the same software packages that are available commercially or will be developed locally;
   d. MLC create a separate network to share whatever is developed operationally in a, b, or c above.
4. Abandon both OCLC and RLIN and MLC create its own utility which can be accomplished by
   a. Purchasing or leasing the WLN software and developing it in conjunction with WLN or separately, or
   b. assuming that MLC members collectively can start a utility of its own which can overcome existing limitations of the two utilities.
5. Although both LC and NCLIS appear to be avoiding the formation of a national network under federal auspices, there is nothing inherent in the situation which denies that the

national libraries, LC and NCLIS could not produce such a national system; that is, instead of MLC members assuming they can build their own utility as described in 4, above, political energies should be marshalled to support the development of a governmentally formulated national system.

What are the consequences of acting on one or several of the above options? The first question is to determine whether to stay with one or the other existing electronic bibliographic utilities. There is a great deal of hard sell now being practiced. Individual libraries and groups feel they must be able to respond to this hard sell. Interestingly the arguments presented for the most part are based on emotion, loyalty to like institutions and paternal assurances. There is no way to compare the two utilities objectively, but as of this writing there are certain things which are evident.

The OCLC service, and its data base, is well established in MLC membership libraries. Although presently viable fiscally, aging computers and a growing data base may require large investments of money for hardware and software. Needs as expressed by many libraries for authority control and subject searching capability through OCLC seems remote. Promises of acquisition modules are still not fulfilled. The serials check-in system appears to be in retreat.

The RLIN system does have a subject search capability not available through OCLC, but lacks the ability for union listing. There are promises for further enhancements as with OCLC, but to assume that the RLIN staff has the ability to solve network problems which OCLC has not solved is perhaps naive. RLIN is still not financially self-sufficient. The same conditions of computer capacity on a growing data base is compounded with RLIN since the system is designed to maintain separate records for each member. Supposedly this redundancy of record maintenance will be reduced sometime in the future. If a library is already using one utility,

the decision to shift to the other has to include the cost of adopting to the other system as compared to the cost of purchasing turnkey, or developing local systems to augment what is lacking.

Data Transfer

Since RLIN is at present searching for new members, it is willing and apparently able to accept data derived through the OCLC system. This is possible for RLIN because each member has its own data base in that system. An RLIN member cannot as yet (if ever) dump its machine readable records into the OCLC data base. This is not to suggest that the OCLC administration is recalcitrant, but it is more due to the inherent complexities of "merging" machine readable data bases derived from different sources.

There are many misunderstandings about computers. One of them is their ability to manipulate and compare data. Electronic data has to be managed or administrated as does any other data. The administration requires coordination between users if the data is shared and that an overall interest predominates in the development and operation of the data base system.

> Proper administration requires a broad knowledge of the use of data throughout the [system]. Such knowledge seldom exists when an individual is deeply involved in a particular application area. In addition, configurating, measuring, and optimizing systems requires a level of technical skill that is not feasible to teach on a broad basis. The requirements for effective and efficient data base management call for a combination of technician and generalist, a synthesis of skills not previously needed in data processing.(6)

Martin assures us that it is easy for a library to move from one system to another if its bibliographic records are in MARC

format.(7) The "easy" is relative and a matter of perspective. There is no assurance that it is economically or intellectually possible to move the content of a data base from one system to another even if the format is the same as in the case of OCLC accepting RLIN produced electronic data. There are many ways to show the difficulties in shifting data from one system to another. The purpose here is not to accent the difficulties, but to bring the situation into the real world of intellectual decision and not rely on the assumption that things are technically feasible when operationally they are not. First of all, computers can deal with data only if it is placed within some kind of order or sequence. This is no different from language communication which requires syntax to make sense. An author can shift paragraphs, sentences or phrases from one part of a paper to another and comprehension can still be possible, but papers are not written by making a random selection of any words in a dictionary and placing them in any order. Analogously a computer does not make sense of random symbols any more than a monkey at a typewriter producing a Shakespearean play. The MARC format is only the sequence in which it has been agreed that certain bibliographic data will be placed, again analogously, like a standard LC catalog card. While we can agree, and apparently have agreed for many years, where the bibliographic elements are to be put on a catalog card, how a given document is described is a matter of choice of rules, or perhaps even is due to the political preference of a cataloger. That a bibliographic description is recorded in MARC format does not assure the accuracy or appropriateness of the content. If there is never any intent to compare or share data between two libraries, the accuracy or variance of content of a record at either library is inconsequential. However, if the intent is to merge data, then any difference in content between the two records requires that (i) a decision be made which one is accurate and to be retained or (ii) both records be maintained in the "merged" file. The latter is not truly merged, but is a combined file.

The difference between a merged file and a combined file is significant; it is not just a quibble among cataloging purists. For example, a library that has purchased a turnkey circulation system may store only part of the bibliographic data it has in machine readable form in its circulation system. So long as the basic elements required for the circulation function remain within the turnkey system, changes in other parts of the record, as subject he dings, or even entry, may make no difference to the circulation operation. But what happens if the library wishes to change to another system or is required to do so because the vendor of the turnkey system stops marketing it? A different complement of bibliographic data may be required. The question of merging files within the same library then becomes an issue. While it may cause only minor difficulty to have a few instances where there are multiple records for the same item, how many instances of such "errors" are necessary before it becomes a major difficulty?

In January 1981, LC will change its cataloging rules. LC expects to update all of the bibliographic records it has published in MARC format. LC may be able to change content elements by a computer formating program because it produced the original records according to a set of rules. A program can be devised to match records. On the other hand, a library that in any way modified the content of an LC MARC produced record for its own use could not depend on the LC formating program. Computers can only match or compare and indicate that data are equivalent or not. And it does this with ruthless accuracy. It cannot read with human comprehension to recognize inconsequential differences as being equal. It must also be remembered that the American library cataloging system not only describes a bibliographic unit uniquely, but also identifies the unit within a library. It locates the bibliographic unit or acts as an index to location. In this sense the cataloging records of each library are unique to that library because it must be interpreted in terms of its organization. It could be domonstrated by example how the rigid sequacious computer

cannot deal with our present complex library bibliographic records automatically, but that would lengthen this discourse into bibliographic and electronic technicalities. The conclusion whether demonstrated or not is that it makes no difference whether a library has its records in a standard LC card format or in an electronic format, changes in cataloging rules and changes in library procedures require a manual comparison of a certain proportion of the records.

In summary, (i) given that no Michigan library can be independent of LC cataloging, (ii) given the limitations of electronic data processing equipment, (iii) assuming there is a limit to the availability of funds, and (iv) given that the Michigan libraries will continue to need to have access to at least the MARC Distribution Service data base, the options listed on page 6 need to be examined for their feasibility; that is, what would be required politically, organizationally and financially to accomplish them. No effort was made to acquire accurate cost data because it was deemed the decisions that need to be made are more political and organizational than financial; the costs suggested are to be interpreted relative to the different options.

Augmenting Utility Systems

Even though there has been a great deal of federal, foundation and institutional funds invested in projects which were to devise the total library automated system, such systems have yet to be produced. What is more confusing in making a decision to use existing systems is that each one has been developed with a different complement of functions. The purpose here is not to compare systems, but to look at different components of library automation to judge decision limits.

MARC Data Manipulation. Tapes of a library's input to either utility can be acquired. These records are essential for any augmentation of utility service or else the library must be willing to input the same data, in part or whole, into another system. There are very few agencies that have developed the software to manipulate bibliographic data in MARC format. Figures are quoted from commercial vendors of 10-15¢ per record to prepare new tapes for computer output microform catalogs. Lesser amounts are quoted to "strip" information to load turnkey systems. Certainly a commercial vendor must make a profit to continue to provide a service, but to assume a library agency, even after the software is developed to use on local equipment, can manipulate MARC data at a much cheaper rate than commercial vendors has not yet been publicly demonstrated. It must also be remembered that if the aim is to merge data, then the incumbent costs described above need to be taken into account. Since there are commercial vendors to manipulate a library's MARC formated data, it would not appear as a primary goal of Michigan libraries to form a special organization to provide such a service--it is only to choose what is wanted and proceed to buy it.

Hardware and Hardware Interfacing. If any manipulation of data is to be done locally, then computing capacity must be made available. The library unit may have to secure its own computer or make arrangements to share a computer with its own institution or another service or try to create a distributive system. The state of technology of computers presents limitations. First, software developed for one complement of equipment cannot be transferred to another without adjustment. Manufacturers and software vendors will state that the problems of adopting software are trivial. Perhaps the immediate cost to the total cost is trivial, but what is often not stated is the maintenance cost. There is not a dynamic system which is maintenance free. A slight change in software or hardware may require many hours, days, weeks or even months to adjust. This is basically no different from the preautomated dynamic systems libraries use--they are all processes. The difference rests in the fact that the computer software (as compared to present

library workflows) maintenance requires an expertise outside the purview of traditional library science training and education. The persons with the expertise look to other administrative structures than a library bureaucracy for their identity and rewards.

There is another dynamic interrelatedness between different hardware components requiring a maintenance expense. Manufacturers of hardware will state as they place a new or modified model on the market that it is compatible with previous models. That may be true at the time of the announcement of the new model, but there is no assurance of continuity of interest in keeping all manufactured components compatible. It is in our capitalistic ethic to make the old obsolete so that the consumer is forced to buy the new. In the same capitalistic spirit the product of one manufacturer may not be compatible with products of another. If "communication" is to occur between two hardware components then an interface must be built to make that possible.

Much has been discussed about Distributed Data Processing (DDP) with the advent of minicomputers; that is, data resides in a "mainframe" complex from which a minicomputer can retrieve data to manipulate and/or to which data can be added. Operations on the data can then be done at either one or the other computer. Where there is a mainframe complex, DDP has not been a concept readily acceptable for several reasons. First, it is argued that the cost of DDP, dollar for dollar, of computing power is twice as expensive as with a central complex. Furthermore, often the administrators of centralized computing facilities feel that the integrity of the data base is threatened with a DDP system. Finally, the decentralization of management of computer operations challenges central control.(8) This situation may change in that mainframe manufacturers are now marketing systems which permit remote computers (of their own products) to interface with central computing facilities. Nevertheless, the technical problems of

bibliographic DDP are far from solved. The two national utilities are not organized for DDP. OCLC allows no DDP from its central facility. Any data secured from OCLC must be manipulated on a separate system. RLIN has dealt with the technical problems of developing the software needed for interfacing hardware complexes by centralizing the software and hardware, but requiring each member to have its own data base. The communication, or interface, between each data base is internal to one computing complex rather than between computer complexes. There is no more provision for DDP with RLIN than with OCLC.

A Michigan library which wishes to manipulate its bibliographic data beyond what it can through the national bibliographic utilities must have access to computing facilities. Is there a way this desire can be channeled so that different libraries of the state can work in concert? Perhaps so, but there are limitations which must be overcome.

1. A library must decide
   a. Whether to purchase computing power from some central facility,
   b. Or purchase its own computer. (Minicomputers vary in price from $30,000 to over $500,000.)
2. The library must develop the software for
   a. Data input (e.g., the MARC formated tapes from OCLC),
   b. Data manipulation,
   c. Data output, and
   d. Interface between computers.
3. The library may purchase a turnkey system with its own hardware-software components. (There is as yet no library turnkey system that offers to provide an interface between its system and another system.)

Any one of these approaches seemingly has large organizational problems if a multitype and varying size library group is to share costs and expertise. Each institution undoubtedly has its computer installation. The cost of developing the interface among the

separate components, in each library, with the present state of the art, is so large it is not worth investigating. Even if equipment could be secured separate from institutional installations, it would be difficult for a group of libraries to purchase common equipment with the objective to share software development because not all of the group would need the same size or quality of equipment. Problems of interface or modification of software again arise.

There is not yet an automated system for bibliographic control and related functions that will lead, with any assurance, to a national bibliographic system. The existing bibliographic utilities are not planning for any distributive data processing, nor are they encouraging any software development for in-house installation to be compatible with the main data base. There is nothing on the horizen which suggests that any utility would allow any interface between its equipment and local library data processing equipment. In fact, the library literature reveals no public announcement of the local use of a mainframe computing facility with a library application for DDP. Nevertheless, the number of variables a single library must deal with if it wishes to take advantage of what appears to be available in hardware and software results in so many options, there is no way to state with any certainty that a particular decision to buy equipment or software will lead to further integration into a national bibliographic system or result in further isolation.

If there is a problem to be solved and there is no one who can be employed to solve it, then one of two positions can be taken: (i) admit the problem as viewed as insoluble and wait for the environment to change on its own so that the problem disappears, or (ii) group forces and talents and proceed to solve the problem oneself. If libraries separately are faced with uncertainty, is it possible for a group of libraries to construct a system suitable to the group either in connection with an existing utility or as a separate entity? The example

of such a system, albeit not created through collective effort, is that of WLN.

On-line Computing

Since the existing utilities have a combination of on-line and batch mode operations, any new programs should move toward further on-line access. To suggest anything else goes against that which is expressed throughout various media which are predicting a console-computer terminal in every home and in every office. The media abetted by computing centers and computer manufacturers imply that this on-line access is already here. It is not here today, nor probably tomorrow. What is technically feasible and what is intellectually definable is still a symbolic construct--not a reliable service in the practical world. Investing large sums of money and manpower has not assured efficient cost effective on-line systems that work. Nelson lists several inadequacies of on-line systems that are incompletely resolved:

1. Although the designers are convinced they have covered all the holes to guarantee the security of data bases, not only of its integrity, but of its access, a more clever designer or an innocent manipulator seems to be able to discover ways to circumvent the most of secure of systems.

2. On-line systems have been unable to control input--garbage in, garbage out.

3. Reliability, as already noted, is never assured in an on-line system. Malfunction of one module may disrupt the whole system. The more terminals on a system, the more disastrous the consequences. The time needed to make a repair is often unpredictable, so hundreds of people could be waiting

at CRT's. What are the economic consequences of such disruptions?

4. Computer folk use the phrase, "data base fun and games" to describe another unresolved irritation. One individual at one terminal could ask a question of the system (whether in fun or in serious gamesmanship) which could require the computer to perform thousands if not tens of thousands of operations with that one question. This ties up the computer and the communication channel. Response time is slowed. Again, the seriousness in efficiency reduction depends on the number of terminals involved.

5. Systems are often designed to match an existing visual structure. This means that lines, dots, dashes and other data unnecessary to a query get conveyed whether wanted or not. As the system adds terminals and the transactions increase, the amount of time it takes to send the unneeded characters down the wire can clog the channel.

Nelson concludes:

> So far we've only looked at the tip of the iceberg of possible on-line snafus. [There are] other major on-line problems like cost effectiveness, the inherent fragility and touchiness of on-line software, the jungle of operator (and programmer) training problems, the almost insoluble problems of incomplete updates and file integrity, the frightening fragility of on-line data, the crushing overhead of back-up and recovery procedures, and the many classic "traps" of initial system design.... There are even other problems, unnamed in this list, all as widespread and as potentially devastating as any we have touched on.(9)

Does this mean that because technology is still not reliable and because there are intellectual difficulties in maintaining data bases, libraries should abandon temporarily efforts to develop and adopt on-line systems?

Washington Library Network

The WLN systems appears to have produced the most complete on-line library network system of use to a multitype library organization. It is far from a total system, but in design

1. The system keeps its data base consistant with LC authority files,
2. An acquisitions module is functioning that relates to the data base,
3. Circulation procedures are to be accomplished through a distributive processing module of some kind, but no interface with the data base is yet operational.

The system works, but is it right?

The WLN organization does not wish to extend itself beyond a certain geographic limit, but it does want to "sell" its software because it wishes to share the further development of the system. It has neither the staff nor the funding to undertake the expansion that seems necessary to the system. It is willing to be a clearing house for any improvements that other users of the software might create.(10)

The WLN system is apparently so designed that the functioning of the system depends on the integrity of the authority file. There are at present two individuals assigned to authenticating the data base with 8,000-9,000 records being added per month. It is admitted that this part of the operation is understaffed. If Michigan libraries were to employ this software, and if all

the libraries now using OCLC were to use this system, a staff of at least 12 persons would be required to maintain the authority files accurate since the MLC libraries now add 50,000 entries per month to the OCLC data base.

Another staffing component is the software maintenance. While the on-line configuration is said to be stable at present, the batch system component requires programmer attendance during all job runs. This situation has to be considered mutable. Stability in such a dynamic and complex system cannot be expected for reasons already given in other contexts: the software development continues, hardware components are still being developed, communication links shift, and growing data bases produce so many operational variables that Murphy's law is and will be frequently enforced. How many people would it take to monitor the systems operation with at least a 12 hour on-line service and at least the batch system operating four evenings a week? Parsimoniously speaking, probably four persons if the present WLN experience is any guide.

The system is still far from complete, how much need be invested in additional developement is problematic. But, a system as complex as WLN's requires a minimum staff to insure productive results. Many competencies have to be available; awareness of technology and evolving network organizational alone would consume a large share of programmers' and analysts' days. A development staff of at least seven is probably the smallest group that could be put together to insure a sound development program.

A computer and a communication system is obviously a necessary part of adopting WLN to the Michigan environment. Thus, how much would it cost to bring the WLN system to Michigan? Once the organization of 20 individuals is built and all the hardware and software is in place, it would probably cost no more than the Michigan libraries are now spending to use the OCLC utility. But the first task to be accomplished would be to build an organization which could make a Michigan utility function trustworthily.

The Future

Every dynamic system searches for homeostasis. The cybernetic conception of dynamic systems points out that small changes can result in oscillation that can destroy a system if not brought under control. On the other hand, small oscillations can bring about large changes in the system while still maintaining its cohesiveness. It becomes important then in our present highly interdependent technologic base society to predict the consequences of introducing changes. A profession of "future research" has come into being to provide decision makers with assurance that actions taken do not lead to destruction. Where once these "futurists" designed methodologies to discover what the results would be with the application of specific technologies, these methodologies are now considered by some to be of limited use. Real world problems are systemic and holistic. Any institutional or inter-institutional situation can neither be simply nor easily broken down to fit a particular technical application.

> Can we find a way then of treating problems so that we can satisfy two equally important and yet at the same time strongly competing (if not opposing) demands? The first demand is that of breaking a problem down into constituent parts or components so that we can then proceed to analyze it. Indeed, this first demand has become so natural and so prevelant that to break a problem down has become virtually synonymous with the notion of analysis. The second demand embodies the notion of putting the parts back again. It is, however, much more than this. It not only means putting the parts back again; it also means recognizing that the original "parts" have no natural existence, let alone meaning, independently of the original "whole" of which they are a part.(11)

Earlier Welke was quoted to bring to the fore that the important question in the application of technology is not whether it works, but whether it is right for the environment at hand. How does one pose the question so that one can determine "rightness"? According to one future researcher it is an

iterative process that must be accepted both by individuals and their organizations. The first step in posing "right" questions

> ...consists in projecting one's perception of the future in relation to some need, want, mission, responsibility, etc., which may be done by rational or intuitive methods. Then from the projected future the perceiver extracts what appear to him to be the relevant problems. In doing so, he begins to define them. The definition of the perceived problems does not mean necessarily that he can easily solve them, and so the perceiver goes round the cycle again, this time to find a structure which can be used to solve the problem which he perceives, thinks, are relevant. Finally, and only after this sort of mental process, can the situation be set out in the kind of conventional dispassionate terms used in management decision making.(12)

The process is continuous. After all, it was not too long ago it was "right" for a particular company to increase the number of buggy whips it manufactured.

What has to be noted about this kind of process is how dependent it is on subjective input. Whether as an individual or as an organization the perception of the future has to be in terms of the conditions of the past. In any organizational matter problems and questions about those problems always are impressed with the social and cultural predilections of the questioner. Without this kind of continuity of view, all social changes would have to take place in a state of crisis and revolution. One definition of the revolutionary is the behavior pattern to planned destruction of the present to insure the future is different from the past. There is a considerable difference abandoning a practice for a more productive "right" one to destroying the environment in which the practice is imbedded.

Only a couple of generations ago there was a need toset up institutions with like functions over a geographic area. Transportation and communication have, in some respects, reduced the need for the duplication of institutions. Technology may have changed the conditions of need for the separateness and duplication of libraries, but the bureaucratic and other territorial

prerogatives keeps the idea of sovereignty (or independence) alive. Each library, when challenged, feels it can do as it wishes. Another way of saying it is that an organizations tends to fit, adjust, or absorb a problem situation into its modus operandi rather than fit the organizational process to the problem. The organization does what it must to survive according to its view of itself. Any action which appears to reduce choice of independent action is judged as unsuitable, a threat. What is threatened in this situation is the organization's position of wealth and power.

Technology, among other things, is threatening the integrity of our library agencies. The only strategy to avoid isolation, or at its worst, destruction, is for change to evolve under planning in a spirit of cooperation. The expected result is a different kind of community which can produce the means to prevent individual organizations (as now seen) from becoming isolated or being destroyed. Continuing the iterative process started on earlier pages is there now a Gestalt to pose contemporaneously "right" questions?

At present there is no alternative to the increased use of the LC produced data base available through the MARC Distribution Service. It is to the collective interest to the user of bibliographic utilities and to the users of products derived from the MARC Distribution Service that the data base continue to be produced and dispensed at least as dependably as now. It follows that it is "right" to base all future plans on the maintenance of the MARC Distribution Service. All users, direct or indirect, of the Service must have the organizational means to monitor the process of change to the data base so that its contents and its format remains useful.

A shift to WLN software by Michigan libraries can only be "right" if there is a sufficiently large group of libraries cooperating to support its continued development. The cost to undertake such a venture would, over the long range, be within the present financial commitment of Michigan libraries to networking, software and hardware purchases.

Since neither utility permits distributive data processing and since there are libraries in the state that do not use the existing national bibliographic utilities, any additional use of computer sensitive records will have to be on an individual institutional effort because there is no practical way available at present to encourage the interfacing of either hardware or software now in place among Michigan libraries. The possibility exists that some agency, in Michigan or outside Michigan, commercial or not for profit, may produce a service which can be used statewide and which will lead toward a national bibliographic network. It could be a "right" solution to duplication of effort, but this possibility, too, will require an increase of interdependence among library agencies. The augmentation of any electronic processing system that shares data among different agencies demands a bureaucratic structure to make it work. The creation of an interinstitutional network will not occur spontaneously and fortunately. It will occur only with planning. The same kind of "critical mass" of specialized persons are necessary for this approach as with continued development of the WLN system. This group of seven must also have access to computing facilities equipped with the most sophisticated data management system's available.

The members of the Michigan Library Consortium that participate in the use of the OCLC data base cannot expect the status quo will continue indefinitely. It must be remembered that there are more libraries in Michigan that do not have access to the OCLC data base than do. Should this latter group organize in a manner which is more conducive to the formation of a national bibliographic system, conditions not discussed here may necessitate the posing of a different set of questions.

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